PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 030304WO	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/US04/41476	International filing date *(day/month/year)* 08 December 2004 (08.12.2004)	Priority date *(day/month/year)* 21 January 2004 (21.01.2004)
International Patent Classification (IPC) or national classification and IPC IPC: **H04L 27/06**(2006.01) USPC: 375/340		
Applicant QUALCOMM INCORPORATED		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☐ *(sent to the applicant and to the International Bureau)* a total of ___ sheets, as follows:
      ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) _____ , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items:
   - ☒ Box No. I Basis of the report
   - ☐ Box No. II Priority
   - ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - ☐ Box No. IV Lack of unity of invention
   - ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - ☐ Box No. VI Certain documents cited
   - ☐ Box No. VII Certain defects in the international application
   - ☐ Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
19 August 2005 (19.08.2005)	07 September 2006 (07.09.2006)
Name and mailing address of the IPEA/ US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Authorized officer Mohammad Ghayour Telephone No. 571-272-8731

Form PCT/IPEA/409 (cover sheet)(April 2005)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/US04/41476

Box No. I Basis of the report

1. With regard to the **language**, this report is based on:

☒ the international application in the language in which it was filed.

☐ a translation of the international application into English, which is the language of a translation furnished for the purposes of:

- ☐ international search (under Rules 12.3 and 23.1(b))
- ☐ publication of the international application (under Rule 12.4(a))
- ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

☒ the international application as originally filed/furnished

☒ the description:
pages 1-23 as originally filed/furnished
pages* NONE received by this Authority on _____
pages* NONE received by this Authority on _____

☒ the claims:
pages 24-30 as originally filed/furnished
pages* NONE as amended (together with any statement) under Article 19
pages* NONE received by this Authority on _____
pages* NONE received by this Authority on _____

☒ the drawings:
pages 1-6 as originally filed/furnished
pages* NONE received by this Authority on _____
pages* NONE received by this Authority on _____

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. ☒ The amendments have resulted in the cancellation of:

- ☒ the description, pages None
- ☒ the claims, Nos. None
- ☒ the drawings, sheets/figs None
- ☒ the sequence listing (*specify*): None
- ☒ any table(s) related to the sequence listing (*specify*): None

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____

** If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/US04/41476

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims Please See Continuation Sheet	YES
	Claims Please See Continuation Sheet	NO
Inventive Step (IS)	Claims Please See Continuation Sheet	YES
	Claims Please See Continuation Sheet	NO
Industrial Applicability (IA)	Claims Please See Continuation Sheet	YES
	Claims Please See Continuation Sheet	NO

2. Citations and Explanations (Rule 70.7)
Please See Continuation Sheet

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

V.1. Reasoned Statements:
The opinion as to Novelty was positive (Yes)with respect to claims 4, 10, 14, 19, 22-24, 26, 28-30, and 32-34
The opinion as to Novelty was negative (No) with respect to claims 1-3, 5-9, 11-13, 15-18, 20, 21, 25, 27, and 31
The opinion as to Inventive Step was positive (Yes)with respect to claims 4, 10, 14, 19, 22-24, 26, 28-30, and 32-34
The opinion as to Inventive Step was negative(NO) with respect to claims 1-3, 5-9, 11-13, 15-18, 20, 21, 25, 27, and 31
The opinion as to Industrial Applicability was positive (YES) with respect to claims 1-34
The opinion as to Industrial Applicability was negative(NO) with respect to claims NONE

V. 2. Citations and Explanations:

1. Claims 1-3, 5-9, 11-13, 15-18, 20, 21, 25, 27, and 31 lack novelty under PCT Article 33(2) as being anticipated by Bjerke et al. (hereafter, referred as Bjerke) (US 2003/0103584).

As to claims 1, 12, and 16, Bjerke discloses a method/apparatus for performing data detection in a wireless communication system (see paragraph 0001), comprising; deriving log-likelihood ratios (LLRs) for code bits of a first data stream based on received symbols for a data transmission (see paragraphs 0028, 0158, Figs. 1 and 4c); estimating interference due to the first data stream (see block 460a); and deriving LLRs for code bits of a second data stream based on the LLRs for the code bits of the first data stream and the estimated interference (see block 452b).

As to claims 2, 13, and 17, Bjerke discloses decoding the LLRs for the code bits of the first data stream to obtain decoded data for the first data stream (see paragraph 0158); and re-encoding and remodulating the decoded data to obtain remodulated symbols for the first data stream (see Fig. 1, blocks 180 and 182), wherein the interference due to the first data stream is estimated based on the remodulated symbols (see paragraph 0161).

As to claims 3 and 18, Bjerke shows that the LLRs for the code bits of the first data stream are derived from the received symbols in real-time without buffering the received symbols (Figs. 1 and 4c).

As to claim 5 Bjerke discloses that the quadrature phase shift keying (QPSK) is used for both the first and second data streams (see paragraphs 0009 and 0036).

As to claim 6, Bjerke discloses that a modulation scheme with a higher order than quadrature phase shift keying (QPSK) is used for the first data stream (see paragraph 0009), wherein the method further comprising: deriving received symbol estimates based on the LLRs for the code bits of the first data stream, and wherein the LLRs for the code bits of the second data stream are derived based on the received symbol estimates and the estimated interference (see paragraph 0161 and Fig. 4c).

As to claim 7, Bjerke discloses that deriving received symbol estimates includes forming two equations for each received symbol based on LLRs for all code bits of a data symbol carried in the received symbol for the first data stream, and wherein a received symbol estimate for the received symbol is derived from the two equations (see paragraphs 0105-0133).

Supplemental Box

As to claim 8, Bjerke discloses that the LLRs for the code bits of the first and second data streams are derived based on a dual-max approximation (see paragraphs 0010 and 0137).

As to claims 9 and 15, Bjerke further discloses deriving channel gain estimates for a wireless channel used for the data transmission, wherein the LLRs for the code bits of the first and second data streams and the interference due to the first data stream are derived with the channel gain estimates (see paragraphs 0089-0096).

As to claim 11, Bjerke discloses that the wireless communication system utilizes orthogonal frequency division multiplexing (OFDM), and wherein the received symbols are from a plurality of sub-bands (see paragraph 0004).

As to claims 20, 27, and 31, Bjerke discloses a method/apparatus for performing data detection in a wireless communication system (see paragraph 0001), comprising; deriving log-likelihood ratios (LLRs) for code bits of a first data stream based on received symbols for a data transmission (see paragraphs 0028, 0158, Figs 1 and 4c); deriving data symbol estimates for the first data stream based on either the received symbols or the LLRs for the code bits of the first data stream (see paragraphs 0161 and 0166); estimating interference due to the first data stream based on the data symbol estimates (see block 460a); and deriving LLRs for code bits of a second data stream based on the received symbols and the estimated interference (see block 452b).

As to claim 21, Bjerke discloses that the data symbol estimates are derived by making hard decisions on either the received symbols or the LLRs for the code bits of the first data stream (see paragraph 0161).

As to claim 25, Bjerke shows that the LLRs for the code bits of the first data stream are derived from the received symbols in real-time without buffering the received symbols (Figs. 1 and 4c).

2. Claims 4, 10, 14, 19, 22-24, 26, 28-30, and 32-34 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest the limitations cited in these claims.

3. Claims 1-34 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry.

----------NEW CITATION----------
US 2003/0103584 A1 (Bjerke et al.) 5 JUNE 2003, see pages 1, 2, 7 -13